030-051-6358-A

BRIDGE RECONNAISSANCE
Part I

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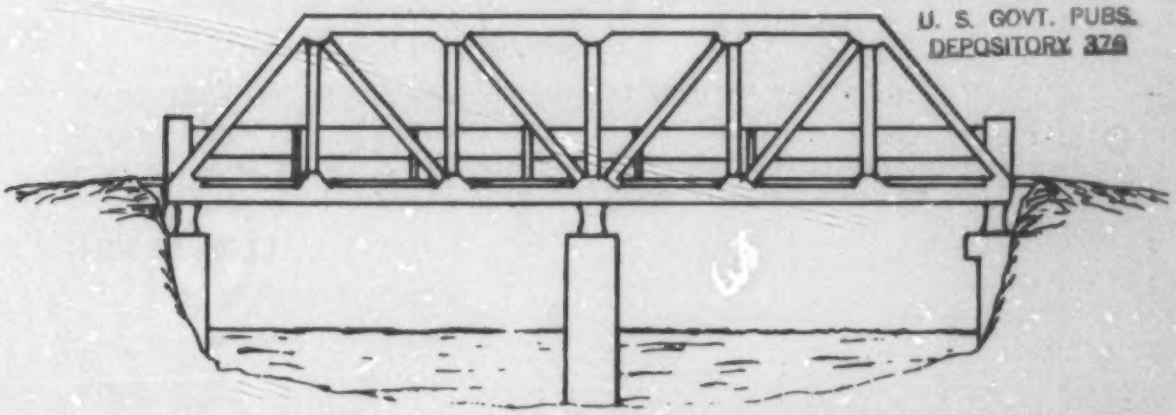
TEC LESSON 030-051-6358-A



PRODUCED BY
UNITED STATES ARMY
ENGINEER SCHOOL
FORT BELVOIR, VIRGINIA 22060

STUDENT/SUPERVISOR INSTRUCTIONS, PRETEST/POSTTEST, AND ANSWER KEY ARE CONTAINED IN THIS BOOK.

REVISED
JUNE 1985

READ THE STUDENT/SUPERVISOR INSTRUCTIONS CAREFULLY. BE SURE YOU UNDERSTAND THEM COMPLETELY BEFORE BEGINNING THE LESSON. PLEASE DO NOT WRITE IN THIS BOOK.

The words "he," "his," and "men," when used in this publication, represent both the masculine and feminine genders, unless otherwise specifically stated.

STUDENT/SUPERVISOR INSTRUCTIONS

TYPE OF LESSON

- Bridge Reconnaissance

AUDIENCE

- MOS 12B—Combat Engineer
- Skill Levels One and Two

TRAINING OBJECTIVES

Soldiers completing this lesson will be able to:

- Identify the type of Bridge Reconaissance.
- Determine what dimensions to obtain.
- Obtain the required bridge dimensions.
- Obtain additional bridge information.

MATERIAL/EQUIPMENT/PERSONNEL REQUIRED

- Pencil and Paper
- DA Form 1249

TIME REQUIRED

- Individual: 60 minutes
- Group: 75 minutes

REFERENCES

- FM 5-34
- FM 5-36

STUDENT/SUPERVISOR INSTRUCTIONS

STUDENT INSTRUCTIONS

- Prerequisites: TEC Lesson 030-051-6351-F
- Take the Pretest/Posttest. If you pass, you do not have to take the lesson.
- Make sure you have the material, equipment, and personnel required to complete the lesson.
- Take the lesson.
- When you complete this lesson, take the Pretest/Posttest again. If you do not pass, take the lesson again.

SUPERVISOR INSTRUCTIONS

- Make sure students have completed the prerequisites listed in the Student Instructions.
- Administer the Pretest/Posttest to determine need for the lesson. If only one soldier is being tested, the test may be taken directly from the book, with response made on a separate sheet of paper. If more than one soldier is being tested, reproduce the test for direct use. To pass the test, a soldier must answer 100% of the items correctly.
- Make sure students have the material, equipment, and personnel required to complete the lesson.
- Administer the lesson to students who do not pass the Pretest/Posttest.
- Administer the Pretest/Posttest to students who complete the lesson. Those who do not pass must take the lesson again.

TEC LESSON 030-051-6358-A
Bridge Reconnaissance
Part I

This test consists of 12 questions that cover every training objective of the lesson. These questions have a total value of 100 points. When you have completed the test, check your answers against the Pretest/Posttest Answer Key. If you do not score 100 points, you must take the lesson—or take it again if you have already taken it. If you are taking the test directly from the instruction book, write your answers on a separate sheet of paper.

1. When preparing for bridge reconnaissance, how do you know which dimensions to obtain?

   A. All 38 elements, always

   B. Depends on the mission

   C. The ones the squad leader says are important

   D. Those on the front of the recon report only

2. What type of bridge reconnaissance do you conduct to gather all dimensions and information necessary to calculate the military load classification.?

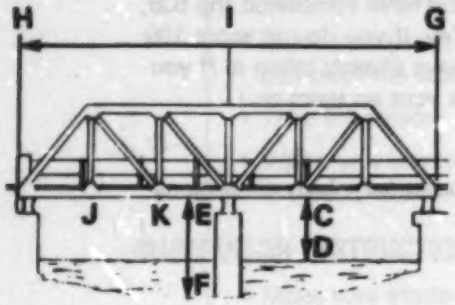
   A. Hasty recon

   B. Deliberate recon

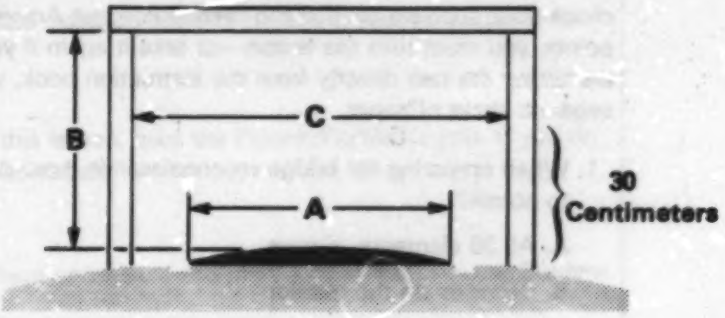
   C. You do not conduct a bridge reconnaissance to gather this information to calculate the military load classification.

3. Identify the following bridge. Then using the GENERAL DIMENSION DATA Table in FM 5-34, list the dimensions you obtain while reconnoitering this bridge.

SIDE VIEW



END VIEW



Number your paper 4 through 8. Using the SIDE VIEW diagram, write the ***pair*** of letters where you would take each of the following measurements.

4. Where do you measure the underbridge clearance?

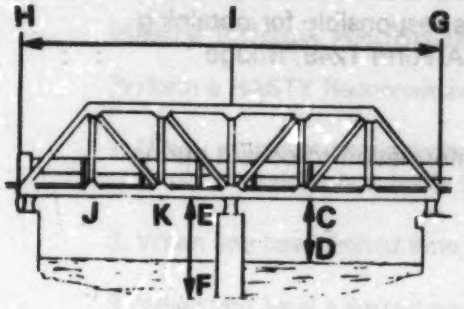
5. Where do you measure the overall length?

6. Where do you measure the distance of each span?

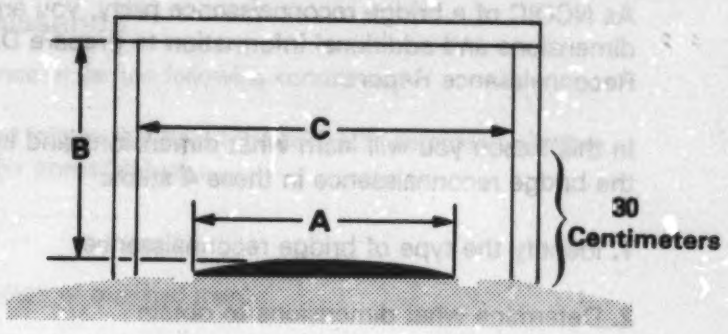
7. Where do you measure the height above the streambed?

8. Where do you measure the panel length?

SIDE VIEW



END VIEW



Number your paper 9 through 11. Using the END VIEW diagram, write the ***letter*** where you would take each of the following measurements.

9. Where do you measure the traveled way width?

10. Where do you measure the overhead clearance?

11. Where do you measure the horizontal clearance?

12. You are reconnoitering a timber truss bridge 5 meters long over water. Using the symbols on the common types of span construction in FM 5-34, record the proper formula for this bridge.

INTRODUCTION

As NCOIC of a bridge reconnaissance party, you are responsible for obtaining dimensions and additional information to prepare DA Form 1249, Bridge Reconnaissance Report.

In this lesson you will learn what dimensions and information to collect during the bridge reconnaissance in these 4 steps:

1. Identify the type of bridge reconnaissance

2. Determine what dimensions to obtain

3. Obtain the required bridge dimensions

4. Obtain additional bridge information

BRIDGE RECONNAISSANCE PREPARATION:

You receive instructions and maps from your supervisor. Before beginning a bridge reconnaisance make sure you know:

1. Purpose of the reconnaissance

2. Location of the bridge, if known

3. Where, when, and to whom you turn in the report

There are two types of bridge reconnaissance:

1. Hasty bridge reconnaissance

2. Deliberate bridge reconnaissance

Study the mission directive carefully. The ***purpose*** and ***conditions*** of the reconnaissance tell you which type to perform.

1) IDENTIFY THE TYPE OF BRIDGE RECONNAISSANCE:

Hasty Bridge Reconnaissance

Perform a HASTY Reconnaissance under the following conditions:

1. When you must obtain limited information about the bridge to determine whether or not the bridge is suitable for immediate use.
2. When you have limited time.
3. When you have a limited amount of qualified men.

The minimum information you obtain during a HASTY Reconnaissance is:

- Type of bridge
- Coordinates of the bridge
- Overall length
- Width of traveled way
- Available bypasses
- Overhead clearance

You will learn more about this information later in the lesson.

1) IDENTIFY THE TYPE OF BRIDGE RECONNAISSANCE (Cont.):

Deliberate Bridge Reconnaissance

Perform a DELIBERATE Reconnaissance under the following conditions:

1. When you must obtain all dimensions and information required to estimate repair or demolitions work and to establish the military load classification.

2. When you have sufficient time.

3. When you have enough qualified personnel.

In this lesson you will learn to perform a DELIBERATE Reconnaissance.

Turn the page for some practice exercises.

PRACTICE EXERCISES:

1. List the information you must obtain before beginning the bridge reconnaissance.

2. List the two types of bridge reconnaissance.

3. You are short of personnel and have very little time to determine whether a certain bridge can be used for immediate tactical use. What type of bridge reconnaissance should you conduct?

4. What type of bridge reconnaissance do you conduct to acquire limited bridge information?

5. What type of bridge reconnaissance do you conduct to gather all dimensions and information necessary to calculate the military load classification?

Turn the page and check your answers.

CHECK YOUR ANSWERS:

1. Before beginning the bridge reconnaissance you must obtain:
   - Purpose of reconnaissance
   - Location of bridge, if known
   - Where, when, and to whom you turn in the reconnaissance report
2. The two types of bridge reconnaissance are:
   - Hasty reconnaissance
   - Deliberate reconnaissance
3. In this case you would conduct a hasty bridge reconnaissance.
4. You would conduct a hasty reconnaissance to acquire limited bridge information.
5. You conduct a deliberate reconnaissance to obtain dimensions and information for calculating the military load classification.

If you had no difficulty with these practice exercises, then you are ready to proceed to Step 2.

2) DETERMINE DIMENSIONS TO OBTAIN:

During a Deliberate bridge reconnaissance, you obtain bridge dimensions and information to prepare DA Form 1249, Bridge Reconnaissance Report and to calculate the military load classification.

You determine what dimensions to obtain depending on the type of bridge you are reconnoitering. You will now learn how to determine what dimensions to obtain during the reconnaissance.

2) DETERMINE DIMENSIONS TO OBTAIN (Cont.):

Turn to the GENERAL BRIDGE DIMENSION DATA Table in FM 5-34. You use this table to determine what dimensions to obtain during a bridge reconnaissance.

Study this table now. Use this table to answer the following questions:

6. You are assigned to recon a simple, stringer bridge. According to the GENERAL DIMENSION DATA Table how may ***general*** dimensions must you measure? List these dimensions.

7. You are assigned to recon a Truss bridge. According to FM 5-34, what dimensions should you obtain during the reconnaissance?

Turn the page to check your answers.

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CHECK YOUR ANSWERS:

6. Seven:
   - Cverall length
   - Number of spans
   - Length of spans
   - Height above streambed
   - Height above estimated normal water level
   - Traveled way width
   - Horizontal clearance

7. If you were reconnoitering a Truss bridge, you should obtain the following dimensions:
   - Overall length
   - Number of spans
   - Length of spans
   - Panel length
   - Height above streambed
   - Height above estimated normal water level
   - Traveled way width
   - Overhead clearance
   - Horizontal clearance

If you had no problems with these exercises, then turn the page for more.

PRACTICE EXERCISES (Cont.):

Turn to the CAPACITY DIMENSION DATA Table in FM 5-34. This table lists the ***capacity*** dimensions you must obtain during a bridge reconnaissance.

Study this table now. Use this table to answer the following questions:

8. How many ***capacity*** dimensions do you measure for an arch bridge? List these dimensions.

9. What ***capacity*** dimensions do you measure for a slab bridge?

Turn the page to check your answers.

CHECK YOUR ANSWERS:

8. Five:
   - Thickness of wearing surface
   - Thickness of flooring, deck, or depth of fill at crown
   - Distance, C to C, between T-Beam, stringers, or floor beams
   - Thickness of arch ring
   - Rise of arch

9. For a slab bridge your should obtain:
   - Thickness of wearing surface
   - Thickness of flooring, deck, or depth of fill at crown

You have just completed Step Two.

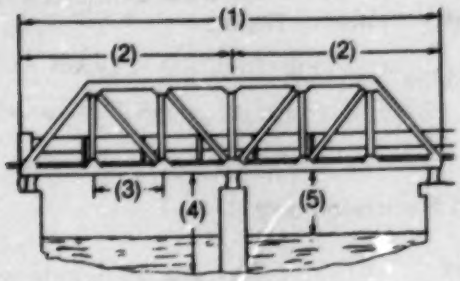
If you had no difficulty with these exercises, turn the page and learn how to obtain the general dimensions.

3) OBTAIN BRIDGE DIMENSIONS:

During the bridge reconnaissance you obtain these dimensions necessary to prepare DA Form 1249, Bridge Reconnaissance Report:

- Overall length of the bridge
- Length of spans
- Panel length (Truss and Suspension only)
- Height above streambed
- Underbridge clearance
- Traveled way width
- Overhead clearance
- Horizontal clearance

3) OBTAIN BRIDGE DIMENSIONS (Cont.):



Using the SIDE VIEW diagram of a bridge span, study the dimensions to obtain:

(1) ***Overall Length:*** measure the distance between the abutments along the bridge centerline.

(2) ***Length of Spans:*** measure the center-to-center distance between bearing.

NOTE: The sum of the span lengths may not equal the overall length.

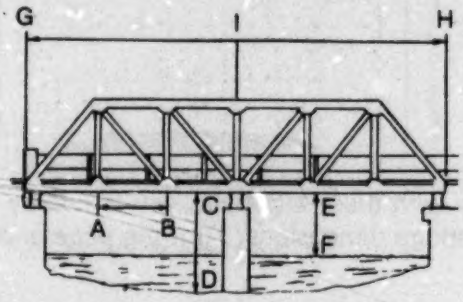
(3) ***Panel Length:*** measure total length of individual panels of the span.

(4) ***Height above Streambed:*** measure from bottom of the streambed to the underside of the bridge.

(5) ***Underbridge Clearance:*** measure the distance between the underside of the bridge and the surface of the ground or water at ***mean*** level.

PRACTICE EXERCISES:

Use the following sketch to answer the practice exercises. You do not need FM 5-34 for these exercises.



10. Write the pair of letters where you measure the height above the streambed.

11. Write the pair of letters where you measure the distance between spans.

12. Write the pair of letters where you measure the overall length.

13. Write the pair of letters where you measure the underbridge clearance.

14. Write the pair of letters where you measure the panel length.

Check your answers on the next page.

CHECK YOUR ANSWERS:

10. C-D

11. G-I, I-H

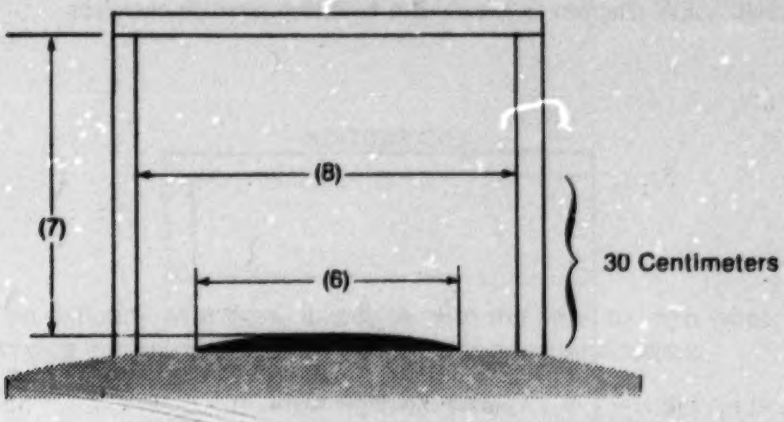
12. G-H

13. E-F

14. A-B

If you had no difficulty with these exercises, you are ready to learn how to obtain the remaining bridge dimensions. Turn the page and proceed.

3) OBTAIN BRIDGE DIMENSIONS (Cont.):



Using the END VIEW diagram of a bridge span, study the dimensions to obtain:

(6) ***Traveled Way Width:*** measure this distance between curbs. Your supervisor uses this measurement in determining the bridge's load classification.

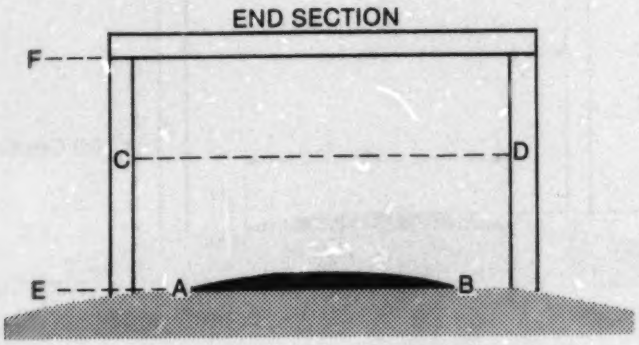
(7) ***Overhead Clearance:*** measure the minimum distance between the traveled way and any obstruction above it. Your supervisor also uses this dimension in determining the bridge's load classification.

(8) ***Horizontal Clearance:*** measure the clear distance between the inside edges of the bridge structure measured 30 centimeters (12 inches) above the surface of the traveled way.

Turn the page for practice.

PRACTICE EXERCISES:

Use the END VIEW diagram to answer the following practice exercises.



15. Write the pair of letters where you measure horizontal clearance.

16. Write the pair of letters where you measure the traveled way width.

17. Write the pair of letters where you measure the overhead clearance.

CHECK YOUR ANSWERS:

15. C-D

16. A-B

17. F-E

If you had no difficulty with these exercises, turn the page to learn what additional bridge information you obtain during the reconnaissance.

4) OBTAIN ADDITIONAL BRIDGE INFORMATION:

During the bridge reconnaissance you obtain the following additional information necessary to prepare DA Form 1249, Bridge Reconnaissance Report:

- Bypass possibilities
- Bridge spans
- Approaches
- Nature of crossing
- Abutments
- Intermediate supports
- Bridge structure

Turn the page to learn more about what information to obtain.

4) OBTAIN ADDITIONAL BRIDGE INFORMATION (Cont.):

Bypass Possibilities

A bypass is an alternative route which enables traffic to avoid using the bridge (obstacle). Analyze the terrain in the immediate vicinity of the bridge for the following information:

- Depth and flow of water
- Condition of banks
- Condition of stream bottom
- Condition of alternative routes
- Condition of terrain

Use the following criteria to determine the amount of improvement needed before troops and vehicles could use these alternative routes.

Bypass Conditions:	**Record as:**
You can cross the obstacle within the immediate vicinity of the bridge by a U.S. 2½-ton truck without work to improved the bypass.	EASY
You can cross the obstacle within the immediate vicinity of the bridge, but some work is required.	DIFFICULT
You can only cross the bypass by either: (a) Repair of existing bridge (b) Construction of a new bridge	IMPOSSIBLE

PRACTICE EXERCISES:

18. Suppose you can only cross an obstacle by new construction. What is the bypass possibility?

19. Suppose you can cross the obstacle within the immediate vicinity with a 2½-ton truck. What is the bypass possibility?

20. Suppose that with some work to prepare the bypass you can cross the obstacle within the immediate vicinity. What is the bypass possibility?

Turn the page to check your answers.

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CHECK YOUR ANSWERS:

18. Impossible

19. Easy

20. Difficult

If you had no difficulty with these exercises, proceed.

4) OBTAIN ADDITIONAL BRIDGE INFORMATION (Cont.):

Study the symbols on the COMMON TYPES OF SPAN CONSTRUCTION Table in FM 5-34. When you are ready, read the following descriptions.

Bridge Spans

Determine the ***TYPE OF SPAN*** construction. On a piece of paper record the number that corresponds with the type of construction. Refer to the sketches on the COMMON TYPES OF SPAN CONSTRUCTION Table in FM 5-34.

Determine the ***COMPOSITION*** of the span construction. On a separate piece of paper record the letter(s) that correspond with the ***composition*** of the span construction. During the reconnaissance refer to the COMMON TYPES OF SPAN CONSTRUCTION Table in FM 5-34 for these symbols.

Follow this procedure to determine the symbols for bridges over water.

1. Determine the type of bridge span. On the job record the appropriate symbol on a piece of paper.
2. Determine the composition of the construction. Record the appropriate symbol on a piece of paper.
3. Record the length of the span in meters.
4. Record the symbol W for a bridge over water.

The following symbol represents a concrete slab bridge 15 meters long over water:

4 k 15m W

If the span is also damaged and, therefore, not usable place an X ***before*** the W:

4 k 15m X W

PRACTICE EXERCISES:

Using the COMMON TYPES OF SPAN CONSTRUCTION Table in FM 5-34 answer the following questions.

21. You are reconnoitering a steel suspension bridge. What symbol should you record in your notes?

22. You are reconnoitering a steel girder bridge. What symbol should you record in your notes for this bridge?

23. The spans are composed of reinforced concrete. What symbol should you record in your notes?

24. The spans are composed of wood. What symbol should you record in your notes?

Write the appropriate symbol for the following bridges.

25. Float bridge with metal construction. The length of the span is 3 meters.

26. Arch bridge composed of stone and brick. The length of the span is 10 meters. The bridge is damaged and not usable and is also above water.

Turn the page to check your answers.

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CHECK YOUR ANSWERS:

21. You should record 7a in your notes.

22. You should record 2a in your notes.

23. ak

24. n

25. 8 a 3m W

26. 5 p 10m X W

If you had no difficulty with these exercises, proceed.

4) OBTAIN ADDITIONAL BRIDGE INFORMATION (Cont.):

Approaches

Obtain the following dimensions and data about the approach routes to and from the bridge:

- Limiting factors
- Minimum traveled way
- Width
- Surface material
- Obstructions

Nature of Crossing

Obtain the following data about the obstacles over which the bridge spans:

- Name
- Width
- Depth

If the crossing is over a water obstacle, obtain the following additional information:

- Current condition
- Width and depth at mean water level
- Tidal conditions
- Flood susceptibility
- Proximity of dams
- Nature and slope of banks
- Type of stream bottom

4) OBTAIN ADDITIONAL BRIDGE INFORMATION (Cont.):

Abutments

Obtain information about:

- Foundation conditions
- Type of abutments
- Composition of the abutments

Intermediate Supports (Bearing Areas)

Obtain the following information about the intermediate supports:

- Foundation
- Type and material of construction,
- Height above ground or mean water level
- Horizontal clearance between supports at ground or mean water level
- Special design features
- Critical dimensions required for demolition or strength calculations.
- Calculations

Bridge Structure

Obtain a detailed description of the ***type*** and ***composition*** of the bridge structure. Also include:

- Capacity dimensions
- Date of construction
- Critical dimensions required for demolition or strength calculations

PRACTICE EXERCISES:

27. List the three main things you obtain about the nature of the crossing.

28. What type of information must you obtain about the abutments?

29. List the data and dimensions you obtain about the approach routes to and from the bridge.

Turn the page to check your answers.

CHECK YOUR ANSWERS:

27. You obtain the following information about the nature of the crossing:
    - Name
    - Width
    - Depth

28. Obtain information about the:
    - Foundation conditions
    - Type of abutments
    - Composition of abutments

29. Obtain the following dimensions and data about the approach routes to and from the bridge:
    - Limiting factors
    - Minimum traveled way
    - Width
    - Surface material
    - Obstructions

You have completed Step Four. When you are ready, ask your supervisor for the lesson test. Good Luck!

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PRETEST/POSTTEST ANSWER KEY

Each of the 12 questions has a value of 8.3 points. The total possible score is 100 points. You must answer all questions correctly to pass this test.

1. B

2. B

3. Truss bridge:
   - Overall length
   - Number of spans
   - Length of spans
   - Height above streambed
   - Traveled way width
   - Horizontal clearance
   - Panel length

4. C-D

5. H-G

6. H-I, I-G

7. E-F

8. J-K

9. A

10. B

11. C

12. I n 5m W

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